Complete Summary

GUIDELINE TITLE

Guidelines for glucose monitoring and treatment of hypoglycemia in breastfed neonates.

BIBLIOGRAPHIC SOURCE(S)

Wight N, Marinelli KA, Academy of Breastfeeding Medicine Protocol Committee. ABM clinical protocol #1: guidelines for glucose monitoring and treatment of hypoglycemia in breastfed neonates. Breastfeed Med 2006 Autumn;1(3):178-84. [39 references] PubMed

GUIDELINE STATUS

This is the current release of the guideline.

It updates a previously published version from 1999.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Hypoglycemia in breastfed neonates

GUIDELINE CATEGORY

Evaluation
Management
Prevention
Screening
Treatment

CLINICAL SPECIALTY

Endocrinology
Family Practice
Gastroenterology
Nursing
Nutrition
Obstetrics and Gynecology
Pediatrics
Preventive Medicine

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Dietitians
Health Care Providers
Hospitals
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To facilitate optimal breastfeeding practices
- To provide guidance in the first hours/days of life to:
    - Prevent hypoglycemia in breastfed infants
    - Monitor blood glucose levels in at-risk term and late-preterm breastfed infants
    - Manage documented hypoglycemia in breastfed infants
    - Establish and preserve maternal milk supply during medically necessary supplementation for hypoglycemia

TARGET POPULATION

Breastfed infants, including ones who are healthy, at-risk for hypoglycemia, and/or diagnosed with documented hypoglycemia

INTERVENTIONS AND PRACTICES CONSIDERED

1. Blood glucose screening and monitoring of at risk infants
2. Establishment of breastfeeding, including initiation and on demand feeding, skin-skin contact of mother and infant, and frequent feedings
3. Supplementation (expressed breast milk, pasteurized donor human milk, elemental formulas, partially hydrolyzed formulas, routine formulas)
4. Intravenous (IV) glucose therapy
5. Expression and feeding of expressed breast milk
6. Documentation of signs, physical examination, screening values, laboratory confirmation, treatment and changes in clinical condition

MAJOR OUTCOMES CONSIDERED

- Plasma glucose levels
- Hypoglycemia-related morbidity

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

An initial search of relevant published articles written in English in the past 20 years in the fields of medicine, psychiatry, psychology, and basic biological science is undertaken for a particular topic. Once the articles are gathered, the papers are evaluated for scientific accuracy and significance.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus (Committee)
Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

I Evidence obtained from at least one properly randomized controlled trial

II-1 Evidence obtained from well-designed controlled trials without randomization

II-2 Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group

II-3 Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.

III Opinions of respected authorities, based on clinical experience, descriptive studies and case reports; or reports of expert committees

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

An expert panel is identified and appointed to develop a draft protocol using evidence based methodology. An annotated bibliography (literature review), including salient gaps in the literature, are submitted by the expert panel to the Protocol Committee.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Draft protocol is peer reviewed by individuals outside of lead author/expert panel, including specific review for international applicability. Protocol Committee's sub-group of international experts recommends appropriate international reviewers. Chair (co-chairs) institutes and facilitates process. Reviews submitted to committee Chair (co-chairs).

Draft protocol is submitted to The Academy of Breastfeeding Medicine (ABM) Board for review and approval. Comments for revision will be accepted for three weeks following submission. Chair (co-chairs) and protocol author(s) amends protocol as needed.

Following all revisions, protocol has final review by original author(s) to make final suggestions and ascertain whether to maintain lead authorship.

Final protocol is submitted to the Board of Directors of ABM for approval.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Risk Factors for Hypoglycemia

Neonates at increased risk for developing neonatal hypoglycemia should be routinely monitored for blood glucose levels irrespective of the mode of feeding. At risk neonates fall into two main categories:

1. Excess use of glucose, which includes the hyperinsulinemic states
2. Inadequate production or substrate delivery (Cornblath & Ichord, 2000)

The infant categories as shown in the Table below are at increased risk for hypoglycemia (Eidelman, 2001; Cornblath et al., 2000; Cornblath & Ichord, 2000; Cowett & Loughead, 2002; de Lonlay et al., 2004; Sunehag & Haymond, 2002).

Table. At-Risk Infants for Whom Routine Monitoring of Blood Glucose Is Indicated

- Small for gestational age (SGA); <10th percentile for weight
- Large for gestational age (LGA); >90th percentile for weight*
- Discordant twin; weight 10% below larger twin
- Infant of diabetic mother, especially if poorly controlled
- Low birth weight (<2500 g)
- Perinatal stress; severe acidosis or hypoxia-ischemia
- Cold stress
- Polycythemia (venous hematocrit [Hct] >70%/hyperviscosity
- Erythroblastosis fetalis
- Beckwith-Wiedemann syndrome
- Microphallus or midline defect
- Suspected infection
- Respiratory distress
- Known or suspected inborn errors of metabolism or endocrine disorders
- Maternal drug treatment (e.g., terbutaline, propranolol, oral hypoglycemics)
- Infants displaying symptoms associated with hypoglycemia (see Table 3 in the original guideline document)

*This remains controversial. Some recommend in unscreened populations in whom LGA may represent undiagnosed and untreated maternal diabetes.

From: Schaefer-Graf UM, Rossi R. Bührer C, et al. Rate and risk factors of hypoglycemia in large-for-gestational-age newborn infants of non-diabetic mothers. Am J Obstet Gynecol 2002;187:913–917; Cahill JB, Martin KL, Wagner CL, Hulsey TC. Incidence of hypoglycemia in term large for gestational age infants (LGA) as a function of feeding type. ABM News Views 2002;8:20.

General Management

Early and exclusive breastfeeding meets then nutritional and metabolic needs of healthy, term newborn infants. Healthy term infants do not develop symptomatic

hypoglycemia simply as a result of underfeeding (Williams, 1997; Eidelman, 2001; Gartner et al., 2005).

1. Routine supplementation of healthy, term infants with water, glucose water, or formula is unnecessary and may interfere with establishing normal breastfeeding and normal metabolic compensatory mechanisms (Hawdon, Ward Platt, & Aynsley-Green, 1992; Swenne et al., 1994; Gartner et al., 2005; National Childbirth Trust, 1997).
2. Healthy term infants should initiate breastfeeding within 30 to 60 minutes of life and continue on demand, recognizing that crying is a very late sign of hunger (Gartner et al., 2005; WHO/UNICEF, 1989). Early breastfeeding is not precluded just because the infant meets the criteria for glucose monitoring.
3. Initiation and establishment of breastfeeding is facilitated by skin-to-skin contact of mother and infant. Such practices will maintain normal infant body temperature and reduce energy expenditure (thus enabling maintenance of normal blood glucose) while stimulating suckling and milk production (Durand et al., 1997; Gartner et al., 2005).
4. Feedings should be frequent, 10 to 12 times per 24 hours in the first few days after birth. (Gartner et al., 2005)

Glucose screening should be performed only on at-risk infants and those with clinical symptoms compatible with hypoglycemia.

1. Routine monitoring of blood glucose in asymptomatic, term newborns is unnecessary and may be harmful (Williams, 1997; Eidelman, 2001; National Childbirth Trust, 1997; Nicholl, 2003; American Academy of Pediatrics [AAP] & American College of Obstetrics and Gynecology [ACOG], 2002).
2. At-risk infants should be screened for hypoglycemia with a frequency and duration related to the specific risk factors of the individual infant (Eidelman, 2001). It is suggested that monitoring begin within 30 to 60 minutes for infants with suspected hyperinsulinemia, and no later than 2 hours of age for infants in other risk categories.
3. Monitoring should continue, until normal, preprandial levels are consistently obtained.
4. Bedside glucose screening tests must be confirmed by formal laboratory testing.

Management of Documented Hypoglycemia

Asymptomatic Infant

1. Continue breastfeeding (approximately every 1 to 2 hours) or feed 3 to 5 mL/kg (up to 10 mL/kg) (Williams, 1997) of expressed breast milk or substitute nutrition (pasteurized donor human milk, elemental formulas, partially hydrolyzed formulas, routine formulas).
2. Recheck blood glucose concentration before subsequent feedings until the value is acceptable and stable.
3. If the neonate is unable to suck or feedings are not tolerated, avoid forced feedings (e.g., nasogastric tube) and begin intravenous (IV) therapy (see the following). Such an infant is not normal and requires a careful examination and evaluation in addition to more intensive therapy.

4. If glucose remains low despite feedings, begin IV glucose therapy and adjust intravenous rate by blood glucose concentration.
5. Breastfeeding may continue during IV glucose therapy when the infant is interested and will suckle. Wean IV glucose as serum glucose normalizes and feedings increase.
6. Carefully document signs, physical examination, screening values, laboratory confirmation, treatment and changes in clinical condition (i.e., response to treatment).

Symptomatic Infants or Infants with Plasma Glucose Levels <20 to 25 mg/dL (<1.1 to 1.4 mmol/L)

1. Initiate intravenous 10% glucose solution.
2. Do not rely on oral or intragastric feeding to correct extreme or symptomatic hypoglycemia. Such an infant is not normal, and requires an immediate and careful examination and evaluation in addition to IV glucose therapy.
3. The glucose concentration in symptomatic infants should be maintained >45 mg/dL (>2.5 mmol/L).
4. Adjust intravenous rate by blood glucose concentration.
5. Encourage frequent breastfeeding after the relief of symptoms.
6. Monitor glucose concentrations before feedings as the IV is weaned, until values are stabilized off intravenous fluids.
7. Carefully document signs, physical examination, screening values, laboratory confirmation, treatment, and changes in clinical condition (i.e., response to treatment).

Supporting the Mother

Having an infant who was thought to be normal and healthy and who develops hypoglycemia is both concerning to the mother and family, and may jeopardize breastfeeding. Mothers should be reassured that there is nothing wrong with their milk, and supplementation is usually temporary. Having the mother hand-express or pump milk that is then fed to her infant can overcome feelings of maternal inadequacy as well as help establish a full milk supply. It is important to provide stimulation to the breasts by manual or mechanical expression with appropriate frequency (eight times in 24 hours) until her baby is latching and suckling well to protect her milk supply. Keeping the infant at the breast, or returning the infant to the breast as soon as possible is important. Skin-to-skin care is easily done with an IV and may lessen the trauma of intervention, while also providing physiologic thermoregulation, contributing to metabolic homeostasis.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of evidence supporting the recommendations is not specifically stated.

The recommendations were based primarily on a comprehensive review of the existing literature. In cases where the literature does not appear conclusive, recommendations were based on the consensus opinion of the group of experts.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate perinatal management to optimally support breastfeeding and avoid hypoglycemia in healthy newborns

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

A central goal of the Academy of Breastfeeding Medicine is the development of clinical protocols for managing common medical problems that may impact breastfeeding success. These protocols serve only as guidelines for the care of breastfeeding mothers and infants and do not delineate an exclusive course of treatment or serve as standards of medical care. Variations in treatment may be appropriate according to the needs of an individual patient.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Foreign Language Translations

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Wight N, Marinelli KA, Academy of Breastfeeding Medicine Protocol Committee. ABM clinical protocol #1: guidelines for glucose monitoring and treatment of hypoglycemia in breastfed neonates. Breastfeed Med 2006 Autumn;1(3):178-84. [39 references] PubMed

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1999 (revised 2006)

GUIDELINE DEVELOPER(S)

Academy of Breastfeeding Medicine - Professional Association

SOURCE(S) OF FUNDING

Academy of Breastfeeding Medicine

A grant from the Maternal and Child Health Bureau, US Department of Health and Human Services

GUIDELINE COMMITTEE

Academy of Breastfeeding Medicine Protocol Committee

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Contributors: Nancy Wight, MD, Children's Hospital and Health Center and Sharp Mary Birch Hospital for Women, San Diego, CA; Kathleen A. Marinelli, MD, University of Connecticut, Hartford, CT (*Lead authors*)

Committee Members: Caroline J. Chantry, MD (*Co-Chairperson*); Cynthia R. Howard, MD, MPH (*Co-Chairperson*); Ruth A. Lawrence, MD; Kathleen A. Marinelli, MD; Nancy G. Powers, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

None to report

GUIDELINE STATUS

This is the current release of the guideline.

It updates a previously published version from 1999.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the Academy of Breastfeeding Medicine Web site.

Print copies: Available from the Academy of Breastfeeding Medicine, 140 Huguenot Street, 3rd floor, New Rochelle, New York 10801.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Procedure for protocol development and approval. Academy of Breastfeeding Medicine. 2007 Mar. 2 p.

Print copies: Available from the Academy of Breastfeeding Medicine, 140 Huguenot Street, 3rd floor, New Rochelle, New York 10801.

Japanese, Korean, and German translations of the original guideline document are available from the Academy of Breastfeeding Medicine Web site.

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI Institute on October 24, 2007. The information was verified by the guideline developer on October 31, 2008.

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